

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.**



NAAC- 'A⁺' Grade

CIRCULAR NO.SU/ B.Sc./NEP-2020/91/2026

It is hereby inform to all concerned that, the Revised syllabi prepared by the Board of Studies/Ad-hoc Boards/Committees and recommended by the Faculty of Science & Technology, **Academic Council at its meeting held on 02nd June 2026** has accepted the following **Revised syllabi of Bachelor of Science & Basket** under the Faculty of Science & Technology as per Norms of **National Education Policy-2020** and as per **Government Letter dated 13 March 2024** run at the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc.Botany	V th and VI th semester
2.	B.Sc.Biotechnology	V th and VI th semester
3.	B.Sc.Zoology	V th and VI th semester
4.	B.Sc.Agrochemical and Fertilizer	V th and VI th semester
5.	B.Sc.Geology	V th and VI th semester
6.	B.Sc.Environmental Science	V th and VI th semester
7.	B.Sc.Home Science	V th and VI th semester
8.	B.Sc.Diary Science and Technology	V th and VI th semester
9.	B.Sc.Automobile Technology	V th and VI th semester
10.	B.Sc.Physics	V th and VI th semester
11.	B.Sc.Chemistry	V th and VI th semester
12.	B.Sc.Analytical Chemistry	V th and VI th semester
13.	B.Sc.Polymer Chemistry	V th and VI th semester
14.	B.Sc.Electronics	V th and VI th semester
15.	B.Sc.Forensic Science & Cyber Security	V th and VI th semester
16.	B.Sc.Microbiology	V th and VI th semester
17.	B.Sc.Fisheries Science	V th and VI th semester
18.	B.Sc.Mathematics	V th and VI th semester
19.	B.Sc.Forensic Science	V th and VI th semester
20.	B.Sc.Information Technology	V th and VI th semester
21.	B.Sc.Horticulture	V th and VI th semester
22.	B.Sc.Networking & Multimedia	V th and VI th semester
23.	B.Sc.Biochemistry	V th and VI th semester
24.	B.Sc.Industrial Chemistry	V th and VI th semester
25.	B.Sc.Bioinformatics	V th and VI th semester

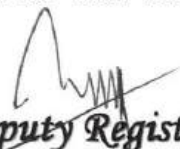
26.	B.Sc.Instrumentation Practice	Vth and VIth semester
27.	B.Sc.Non-Conventional and Conventional Energy	Vth and VIth semester
28.	B.Sc.Statistics	Vth and VIth semester
✓ 29.	B.Sc.Computer Science	Vth and VIth semester
30.	Bachelor of Computer Application	Vth and VIth semester

This is effective from the Academic Year 2026-27 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/AC.No.06/4498-113
Date:- 12.06.2026.

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Deputy Registrar,
Syllabus Section

Copy forwarded with compliments to :-

- 1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] **The Director, Board of Examinations & Evaluation,** Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.

Dr. Babasaheb Ambedkar Marathwada University,

Chhatrapati Sambhajinagar -431001



B. Sc. Degree Programme

(Three Year/ Four Years (Hons)/ FourYears (Hons with Research)

Course Structure and syllabus for

B.Sc.ThirdYear

(AS PER NEP-2020)

Subject: B.Sc. Computer Science

3/ 4 Year Degree Course

Effective from 2026-27


6/06/2026
Professor Bhaskar Sathe,
Dean,
Faculty of Science & Technology,
Dr. Babasaheb Ambedkar
Marathwada University,
Chhatrapati Sambhajinagar


R.R. MANZA

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BSc Third Year: 5th Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	CS/DSC/T/300	Python-I	Theory Course	2		2		2+2+2+2= 08
	CS/DSC/T/301	RDBMS Using SQL	Theory Course	2		2		
	CS/DSC/P/326		Practical based on CS/DSC/T/300		4		2	
	CS/DSC/P/327		Practical based on CS/DSC/T/ 301		4		2	
Discipline Specific Electives (DSE) (Choose any one from CS/DSE/T/300and CS/DSE/T/ 301) and corresponding Practicals	CS/DSE/T/300	AI Basics	Theory Course	2		2		2+2=4
	CS/DSE/T/301	Data Visualization Using Power Bi	Theory Course	2		2		
	CS/DSE/P/326		Practical based on CS/DSE/T/300		4		2	
	CS/DSE/P/327		Practical based on CS/DSE/T/ 301		4		2	
Minor (Choose any two from pool of courses) It is from different discipline of the same faculty	CS/Mn/T/300		To be chosen from other discipline of same faculty	2		2		2+2 = 04
	CS/Mn/T/ 301		To be chosen from other discipline of same faculty	2		2		
VSC (Vocational Skill Courses) (Choose any one from CS/VSC/T/300and CS/VSC/T/ 301) and corresponding Practicals	CS/VSC/T/300	Advance IoT	Theory Course	2		2		2+2 =04
	CS/VSC/T/301	Advance Networking	Theory Course	2		2		
	CS/VSC/P/326		Practical based on CS/VSC/T/300		4		2	
	CS/VSC/P/327		Practical based on CS/VSC/T/ 301		4		2	
OJT/ FP/CEP/CC/RP (Choose any one from pool of courses)	CS/FP/CEP/P/326		Field Project / community engagement and service		4		2	02
				12	20	12	10	22

Minor Courses for other Discipline

CS/Mn/T/ 300 : **E-Commerce** This is a 2 credit theory course to be designed for other discipline

CS/DSE/T/ 301: **Digital Marketing** This is a 2 credit theory course to be designed for other discipline

BSc Third Year: 6th Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	CS/DSC/T/350	Python-with Data Science	Theory Course	2		2		2+2+2+2+2 = 10
	CS/DSC/T/351	ASP.Net	Theory Course	2		2		
	CS/DSC/P/376		Practical based on CS/DSC/T/350		4		2	
	CS/DSC/P/377		Practical based on CS/DSC/T/ 351		4		2	
	CS/DSC/T/352	Vedik Maths	IKS-2 (Indian Knowledge System related to Major)	2		2		
Discipline Specific Electives (DSE) (Choose any one from CS/DSE/T/350 and CS/DSE/T/351) and corresponding Practicals	CS/DSE/T/350	ML Basics	Theory Course	2		2		2+2=4
	CS/DSE/T/351	Word-Press	Theory Course	2		2		
	CS/DSE/P/376		Practical based on CS/DSE/T/ 350		4		2	
	CS/DSE/P/377		Practical based on CS/DSE/T/ 351		4		2	
Minor (Choose any one from pool of courses) It is from different discipline of the same faculty	CS/Mn/T/350		To be chosen from other discipline of same faculty	2		2		2+2 = 04
	CS/Mn/T/351		To be chosen from other discipline of same faculty	2		2		
OJT/ FP/CEP/CC/RP (Choose any one from pool of courses)	CS/OJT/P/376		On Job Training		8		4	04
				12	20	12	10	22
Exit option : Award of UG degree in Major with 132 credits OR continue with Major and Minor								

Minor Courses for other Discipline

CS/Mn/T/ 350: **Ethics and Cyber Law** This is a 2 credit theory course to be designed for other discipline

CS/Mn/T/ 351: **Social Media Marketing** This is a 2 credit theory course to be designed for other discipline

Detailed Illustration of Courses included in 5th and 6th semester:

1) **Major (Core) subject** are mandatory.

CS/DSC/T/300 : This is a 2 credit theory course corresponding to Major (core) subject

CS/DSC/T/301 : This is a 2 credit theory course corresponding to Major (core) subject

CS/DSC/P/326 : This is a 2 credit practical course based on CS/DSC/T/300

CS/DSC/P/327 : This is a 2 credit practical course based on CS/DSC/T/301

CS/DSC/T/350 : This is a 2 credit theory course corresponding to Major (core) subject

CS/DSC/T/351 : This is a 2 credit theory course corresponding to Major (core) subject

CS/DSC/P/376 : This is a 2 credit practical course based on CS/DSC/T/350

CS/DSC/P/377 : This is a 2 credit practical course based on CS/DSC/T/351

CS/DSC/T/352 (IKS-2) : This is a 2 credit theory course corresponding to Indian Knowledge System related to Major

2) **Discipline Specific Electives (DSE) :** (Needs to be chosen any one from pool of courses available at respective college). **These courses should be chosen related to Major.**

CS/DSE/T/300 : This is a 2 credit discipline specific course (elective) related to Major

CS/DSE/T/301 : This is a 2 credit discipline specific course (elective) related to Major

CS/DSE/P/326 : This is a 2 credit practical course based on CS/DSE/T/300

CS/DSE/P/327 : This is a 2 credit practical course based on CS/DSE/T/301

CS/DSE/T/350 : This is a 2 credit discipline specific course (elective) related to Major

CS/DSE/T/351 : This is a 2 credit discipline specific course (elective) related to Major

CS/DSE/P/376 : This is a 2 credit practical course based on CS/DSE/T/350

CS/DSE/P/377 : This is a 2 credit practical course based on CS/DSE/T/351

3) **Minor : It is from different discipline of the same faculty**

CS/Mn/T/300 : This is a 2 credit theory from different discipline of the same faculty

CS/Mn/T/301 : This is a 2 credit theory from different discipline of the same faculty

CS/Mn/T/350 : This is a 2 credit theory from different discipline of the same faculty

CS/Mn/T/351 : This is a 2 credit theory from different discipline of the same faculty

1) **VSC (Vocational Skill Courses) :** Choose any one from pool of courses. These courses should be based on Hands on Training corresponding to Major (core) subject.

CS/VSC/T/300 : This is a 1 credit theory course based Hands on Training corresponding to Major (core) subject.

CS/VSC/T/301 : This is a 1 credit theory course based Hands on Training corresponding to Major (core) subject.

CS/VSC/P/326: This is a 1 credit practical course based on CS/VSC/T/300

CS/VSC/P/327: This is a 1 credit practical course based on CS/VSC/T/301

2) **CS/FP/CEP/P/326 :** Field Project / Community engagement and service : This is a 2 credit practical course related to Field Project / community engagement and service

3) **CS/OJT/P/376 :** This is a 4 credit practical course related to On job Training



B. Sc.

Computer Science (Major)
Semester - V

CS/DSC/T/300: Python-I Total Credits : 02 Total Contact Hours : 30 Hrs. Maximum Marks : 30		
Learning Objectives of the Course: i) To introduce the fundamentals of Python programming. ii) To develop problem-solving skills using Python. iii) To understand basic programming constructs such as variables, operators, control structures, and functions. iv) To enable students to write simple Python programs for real-world problems.		
Course Outcomes (COs) : After completion of the course, students will be able to i) Understand Python programming environment and syntax. ii) Use variables, operators, and data types in Python. iii) Implement decision-making and looping statements. iv) Work with Python functions and basic data structures. v) Develop simple Python programs.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction to Python: Introduction to Programming Languages, History and Features of Python, Applications of Python, Installing Python and Python IDE, Structure of a Python Program, Python Keywords and Identifiers, Comments and Indentation in Python.	10 Hrs.
II	Data Types and Operators: Variables and Assignment, Built-in Data Types: Integer, Float, String, Boolean, Type Conversion, Input and Output Functions, Operators in Python: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Membership and Identity Operators.	10 Hrs.
III	Control Statements: Conditional Statements: if statement, if-else statement, nested if, elif ladder, Looping Statements: while loop, for loop, break, continue and pass statements.	10 Hrs.
References: 1. “Python Programming: Using Problem Solving Approach” – Reema Thareja, Oxford University Press India, 2019. 2. “Taming Python by Programming” – Jeeva Jose, Khanna Publishing House, 2023. 3. “Programming in Python”– Pooja Sharma, BPB Publications, 2018. 4. “An Introduction to Python Programming”– Mohbey & Bakariya, BPB Publications, 2022. 5. “Python Programming: An Introduction to Computer Science” - John M. Zelle, Franklin, Beedle & Associates, 2016		

CS/DSC/T/ 301: RDBMS Using SQL		
Total Credits: 02		Total Contact Hours: 30 Hrs.
Maximum Marks: 50		
Learning Objectives of the Course:		
i) To explain basic database concepts, applications, data models, schemas and instances. ii) To demonstrate the use of constraints and describe the basics of SQL and construct queries using SQL iii) To emphasize the importance of normalization in databases. iv) To facilitate students in Database design		
Course Outcomes (COs) :		
After completion of the course, students will be able to		
i) Understand and explain basic RDBMS concepts. ii) Apply design principals of normalization iii) Use SQL commands to define and manage database structures. iv) Design and execute optimized SQL queries to support business requirements.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Relational model concepts: Domains, Tuples, and Attributes. Relational Algebra and Calculus: Select, Project, Join, and Union operations. Normal Forms: First (1NF), Second (2NF), Third (3NF), and Boyce-Codd (BCNF). Concepts of Distributed databases	10 Hrs.
II	Structured Query Language (SQL): CREATE, ALTER, DROP, TRUNCATE. Advanced SQL: Joins (Inner, Outer, Self), Subqueries, Aggregate functions, and Set operators. DCL/TCL (Data Control/Transaction Control Language): GRANT, REVOKE, COMMIT, ROLLBACK, SAVEPOINT. PL/SQL : Overview of PL/SQL, PL/SQL Data Types, Structure of PL/SQL blocks ,PL/SQL	10 Hrs.
III	PLSQL Conditional selection statements IF-THEN, IF-THEN-ELSE, IF-THEN-ELSIF, CASE Statement, Loop statements WHILE LOOP, FOR LOOP, CONTINUE, Sequential control statements GOTO, NULL. Cursors Implicit Cursors, Explicit Cursors, Procedures, and Functions. Database Triggers.	10 Hrs.
References:		
1. Silberschatz, H.F. Korth and S. Sudarshan, <i>Database System Concepts</i> , 7th Edition, McGraw Hill, March 2019 2. Ramez Elmasri and Shamkant B. Navathe , <i>Fundamentals of Database Systems</i> , Peason Education, 12 May 2018 3. Majumdar & Bhattacharya , <i>Database Management Systems</i> , TMH, 2007 4. Nilesh Shah, <i>Database Systems using Oracle</i> , 2nd edition, PHI. 5. Debabrata Sahoo , <i>Database Management Systems</i> , Tata McGraw Hill		

CS/DSC/P/ 326: Practical based on CS/DSC/T/300 (Python- I) Total Credits : 02 Maximum Marks : 50		Total Contact Hours : 60 Hrs
List of experiments		
1	Write a Python program to display “Hello, Python!” using proper indentation and comments.	
2	Write a Python program to print Python keywords using the keyword module.	
3	Write a Python program to take input from the user and display the entered name and age.	
4	Write a Python program to perform arithmetic operations (addition, subtraction, multiplication, division) on two numbers.	
5	Write a Python program to demonstrate different data types (integer, float, string, boolean).	
6	Write a Python program to convert data types (integer to float, float to integer, string to integer).	
7	Write a Python program to calculate the area of a circle using user input.	
8	Write a Python program to check whether a number is even or odd using an if statement.	
9	Write a Python program to find the largest of two numbers using if-else.	
10	Write a Python program to find the largest of three numbers using nested if.	
11	Write a Python program to check whether a number is positive, negative, or zero using elif ladder.	
12	Write a Python program to print numbers from 1 to 10 using a while loop.	
13	Write a Python program to print numbers from 1 to 10 using a for loop.	
14	Write a Python program to find the factorial of a number using a loop.	
15	Write a Python program to print the multiplication table of a given number.	
16	Write a Python program to demonstrate the use of break statement in a loop.	

CS/DSC/P/ 327: Practical based on CS/DSC/T/ 301(RDBMS Using SQL) Total Credits : 02 Maximum Marks : 50	
List of experiments	
1	Install and configure a DBMS (MySQL, Oracle, or PostgreSQL)./ Create account and use basic DDL ,DML commands using https://freesql.com
2	Write examples for conversions of Unnormalized Table to 1NF and 2NF normalized tables.
3	Create a database having two tables with the specified fields, to computerize a library system of a University College. LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price), IssuedBooks (Accession number, Borrower). Alter tables by adding Primary key and foreign key and insert at least 5 records in each table.
4	Perform Delete, Update operation using “where” Clouse.
5	Demonstrate use of groupby and orderby Clouse on above tables
6	Create following tables Customer (CustID, email, Name, Phone, ReferrerID) Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo) BicycleModel(ModelNo, Manufacturer, Style) Service (StartDate, BicycleID, EndDate) Alter Customer table, to add primary key on CustID & foreign key on ReferrerId. i. In Bicycle table, BicycleID is the primary key , CustId is a foreign key & ModelNo is also foreign key ii. In BicycleModel table, ModelNo is the primary key. iii. In Service table, BicycleId is a foreign key. Note :Create table in this order: (i), (iii), (ii), (iv) a) Create the tables and insert at least 5 records in each table.
7	Write SQL statement for following (Use Exp. 6 Tables) a) List all the customers who have the bicycles manufactured by manufacturer “Honda”. b) List the bicycles purchased by the customers who have been referred by Customer “C1” c) List the manufacturer of red colored bicycles. d) List the models of the bicycles given for service.
8	Write examples for following SQL Commands a) Create table b) SELECT DISTINCT c) Alter table d) Like e) Group by

	f) Having g) Drop table
9	Write a PL/SQL Program to demonstrate Procedure
10.	Write a PL/SQL Program to demonstrate Function
11.	Write a PL/SQL program to demonstrate Triggers.

CS/DSE/T/300: AI Basics		
Total Credits : 02 Maximum Marks : 50		Total Contact Hours : 30 Hrs.
Learning Objectives of the Course: - Introduce the fundamental concepts and scope of Artificial Intelligence. - Familiarize students with problem-solving and search techniques. - Provide a basic understanding of knowledge representation and reasoning - Introduce elementary machine learning concepts and applications of AI - Develop awareness of ethical and social issues related to AI		
Course Outcomes (COs) : After completion of the course, students will be able to - CO1: Explain the basic concepts, history and applications of Artificial Intelligence. - CO2: Apply basic problem-solving and search techniques. - CO3: Describe knowledge representation and reasoning methods. - CO4: Understand fundamental machine learning concepts. - CO5: Identify ethical, social and professional issues in AI systems.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction: Definition of Artificial Intelligence, History and evolution of AI, Intelligent agents and environments, Characteristics of intelligent systems, Areas and applications of AI, Advantages and limitations of AI.	10 Hrs.
II	Problem Solving and Search Techniques: Problem formulation and state-space representation, Uninformed search techniques , Breadth First Search, Depth First Search, Informed search techniques , Heuristic search, Best First Search, A* algorithm, Comparison of search strategies.	10 Hrs.
III	Knowledge Representation and Reasoning: Knowledge and types of knowledge, Knowledge representation methods: Propositional logic, Predicate logic (basic concepts), Inference mechanisms, Forward and backward chaining, Introduction to expert systems, AI Applications and Ethics: AI in healthcare, education, Natural Language Processing, Computer vision,	10 Hrs.
References: “Artificial Intelligence “- Dr. Narayana Prasad Padhy, Oxford University Press India, 2023. “Artificial Intelligence”, 2nd Edition, Saroj Kaushik , Cengage India, (Year approx. 2023). “Artificial Intelligence for All”, Utpal Chakraborty, BPB Publications, 2020. “Think AI”, Swapnali Joshi Naik , BPB Publications, 2022.		

CS/DSE/T/ 301: Data Visualization with power BI		
Total Credits :02		TotalContactHours:30Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) To understand the basic concepts and importance of data visualization. ii) To learn different types of charts and visualization techniques. iii) To understand principles of effective visualization like color, layout, and perception. iv) To develop skills in using visualization tools and interactive dashboards. v) To learn how to present data insights clearly using visual storytelling.		
Course Outcomes(COs): After completion of the course, students will be able to i) Understand and explain different data visualization concepts and techniques. ii) Select appropriate charts and graphs for different types of data. iii) Apply design principles to create clear and effective visualizations. iv) Create interactive dashboards and visual reports using vialization tools. - v)Communicate data insights and findings effectively through visual storytelling.		
Module No.	Topics/Actual Contents of the Syllabus	Contact Hours
I	Unit 1: Introduction to Data Visualization - Definition and importance of data visualization, Types of data visualization techniques, Overview of data visualization tools and software. Principles of Effective Data Visualization - Gestalt principles and visual perception, Color theory and best practices, Layout and composition guidelines, Data storytelling and narrative techniques.	05 Hrs.
II	Unit 2: Data Types and Visualization Technique - Visualizing numerical data: line charts, bar charts, scatter plots, etc, visualizing categorical data: pie charts, stacked bar charts, treemaps, etc, Visualizing temporal data: time series plots, heatmaps, calendars, etc, Visualizing spatial data: maps, choropleth maps, cartograms, etc. Interactive Data Visualization - Introduction to interactive visualization tools, Adding interactivity using tooltips, filters, and selection, Creating interactive dashboards and exploratory visualizations, Designing for user engagement and ease of use.	10 Hrs.
III	Unit 3: Advanced Data Visualization Techniques - Network visualization and graph-based data, Hierarchical and tree-based visualizations, 3D and multidimensional visualizations, Geospatial and geo-visualization techniques. Data Visualization and Storytelling - Communicating insights through effective data visualization, designing visual narratives and story arcs, integrating text, annotations, and annotations into visualizations, Presenting data visualizations to diverse audiences. Data Visualization Ethics and Best Practices - Ethical considerations in data visualization, Data accuracy, integrity, and representation, Avoiding bias and misleading visualizations, Responsible data storytelling and interpretation. Case Study: Bank Loan data , Social media network data.	15 Hrs.
References: i) The Visual Display of Quantitative Information – by Edward R. Tufte ii) Fundamentals of Data Visualization – by Claus O. Wilke iii) Data Visualization: A Practical Introduction – by Kieran Healy iv) Handbook of Data Visualization – by Chun-houh Chen, Wolfgang Härdle, and Antony Unwin v) Hands-On Data Visualization: Interactive Storytelling from Spreadsheets to Code – by Jack Dougherty and Ilya Ilyankou		

CS/DSE/P/ 326: Practical based on CS/DSE/T/300 (AI Basics)	
Total Credits : 02	Total Contact Hours : 60 Hrs
Maximum Marks : 50	
List of experiments	
1	Write a Python program to demonstrate a simple rule-based AI system (e.g., decision-making using if-else).
2	Identify and classify different types of intelligent agents with real-life examples.
3	Write a Python program to implement Breadth First Search (BFS) for a graph.
4	Write a Python program to implement Depth First Search (DFS) for a graph.
5	Compare BFS and DFS using a sample graph and display traversal results.
6	Write a program to solve the 8-puzzle problem using a simple search approach.
7	Implement Best First Search algorithm using a heuristic function.
8	Write a Python program to implement the A* (A-star) algorithm .
9	Compare uninformed and informed search techniques with suitable examples.
10	Write a program to solve the 8-puzzle problem using a simple search approach.
11	Write a program to represent knowledge using propositional logic .
12	Demonstrate forward chaining using a simple rule-based system.
13	Demonstrate backward chaining using a simple rule-based system.
14	Create a simple expert system (e.g., medical diagnosis or student grading system).
15	Develop a short case study program that simulates an AI-based healthcare recommendation system and write a brief report identifying at least three ethical concerns (bias, privacy, accountability).

CS/DSE/P/ 327: Practical based on CS/DSE/T/301 (Data Visualization with power BI) Total Credits :01 Maximum Marks : 50		TotalContactHours:15Hrs
List of experiments		
1	Study of Components of Power BI.	
2	Installation of Power BI	
3	Importing Data from Various data sources.	
4	Data Transformation.	
5	Handling messy data.	
6	Creating new measure and quick measure.	
7	DAX Aggregate Functions.	
8	DAX functions (Text, Logical, Date, Counting).	
9	Pivot Table	
10	Create a bar chart for categorical data. • Create a line chart for time series data. • Create a pie chart for percentage distribution. • Create a scatter plot to show relationship between variables. • Create a histogram for data distribution. • Create a stacked bar chart or treemap. • Create a heatmap visualization. • Create a map-based visualization.	
11	Study of different filters.	
12.	Study of slicers.	
13.	Story telling with data.	
14.	Creating interactive dashboard.	
15.	Case Study.	

CS/VSC/T/300 : Advance IoT		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) To understand Industry 4.0 architecture ii) To understand the overview of architecture in IoT. iii) To learn about various sensors and actuators iv) To understand Embedded Systems frameworks		
Course Outcomes (COs) : After completion of the course, students will be able to i) Familiar with fundamentals of Industry 4.0 ii) Identify and use different types of sensors used in real systems iii) Implement various actuators used in IoT systems iv) Understand the concepts and use of Embedded system & IoT		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction Industry 4.0, Four Industrial Revolutions, Industry 4.0 Benefits and Challenges, Technologies in Industry 4.0: Industrial Internet of Things (IIoT), Big Data and Analytics, Cloud Computing, Edge Computing, AI and Machine Learning, Digital Twins, Cyber Security	10 Hrs.
II	Sensing and Actuation Role of Sensors and Actuators in IoT, Sensors- Definition, types of Sensors- Definition, characteristics, Moisture sensor, Level sensor, PI sensor, Sound sensor, Color sensor, LDR, Pressure Sensor, Flow Sensor, accelerometer, Gyroscope. Actuators- Definition, characteristics, Electric Actuators, Hydraulic Actuators, Pneumatic Actuators, Thermal/Magnetic Actuators	10 Hrs.
III	Applications and Case Studies Introduction to IoT Tools: Arduino, Raspberry Pi and ESP32. Python Libraries: pyFirmata, MicroPython. Case study : Smart Home Automation, Smart Agriculture, Healthcare Monitoring, Industrial IoT	10 Hrs.
References: 1) Klaus Elk, “Embedded Software Development for the Internet of Things”, CreateSpace 2) Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-on Approach)", VPT. 3) Charles Bell, “Beginning Sensor Networks with XBee, Raspberry Pi and Arduino”, Apress 4) Rajib Mall, "Real-Time systems Theory and Practice" Pearson Education, 2007. 5) Satish Jain, Shashi Singh , Internet of Things (IOT) & Its Applications, BPB		

CS/VSC/T/ 301: Advance Networking		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) To review the computer networking concepts ii) To impart concepts of advanced computer networking. iii) To study Network Routing & Wireless Network. iv) To study & Setup Microsoft Server 2012		
Course Outcomes (COs) : After completion of the course, students will be able to i) Enumerate the layers of the OSI model and TCP/IP. ii) Identify the different types of network devices and their functions within a network. iii) Understand the different Wireless technologies. iv) Setup & Implement Microsoft Server 2012		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction Networking fundamentals review, OSI Model, TCP/IP Model, Comparison of OSI & TCP/IP Model, Firewalls, IPv4 vs. IPv6 concepts, Digital To Analog Conversion, Amplitude Shift Keying (ASK) Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Multiplexing Technique, Bluetooth, Cryptography, Network Security, Digital Signature, Satellite Networks.	10 Hrs.
II	Network Routing:- Structure of a Router, Basic Router Configuration, Building a Routing Table, Static Routing, Dynamic Routing Distance Vector Routing Protocol (RIPv1, RIPv2, EIGRP), Link State Routing Protocols (OSPF). Wireless Network: Wireless Communication:- 3G, 4G, 5G , SDN (Software Defined Network)- Architecture, Working, Applications , Multimedia Wireless Networks:- Streaming Audio and Video, Voice Over Internet Protocol (VoIP), Protocols:-Real-time Transport Protocol(RTP), Real-Time Streaming Protocol (RTSP).	10 Hrs.
III	Windows Server 2012:- Introduction, Windows server 2012 editions, features, server licensing , installation options, volume disk, Dynamic Host configuration protocols (DHCP) server, Active directory services (ADS), Hyper V virtualization. Internet Information Service (IIS), DNS, Disk Management Terminology	10 Hrs.
References: 1) Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, Firoz Mosharaf, Tata McGraw Hill, 2012 2) Tanenbaum AS, Wetherall DJ. Computer Networks. Fifth edition, Pearson Education, Inc. 2011. 3) Microsoft® Windows Server 2012 Administration INSTANT REFERENCE By Matthew Hester and Chris Henley , SYBEX A Wiley Brand		

CS/VSC/P/ 326: Practical based on CS/VSC/T/300 (Advance IoT)

Total Credits : 02

Total Contact Hours : 30 Hrs.

Maximum Marks : 50

List of Experiments

1. Study of experiment based Moisture sensor
2. Study of experiment based Level sensor
3. Study of experiment based Passive Infrared sensor
4. Study of experiment based Sound sensor
5. Study of experiment based Color sensor
6. Study of experiment based LDR
7. Study of experiment based Pressure Sensor
8. Study of experiment based Flow Sensor
9. Study of experiment based accelerometer
10. Study of experiment based Gyroscope.

CS/VSC/P/ 327 : Practical based on CS/VSC/T/ 301(Advance Networking)	
Total Credits : 02	Total Contact Hours : 60 Hrs.
Maximum Marks : 50	
List of Experiments	
1	Setup a Local Area Network (LAN) using Wire & Wireless
2	Implement Network Monitoring system on Network
3	Installation and configuration of Microsoft Windows Server 2012
4	To Install and configure Active Directory services (ADS) in MS Windows Server 2012
5	Creating Global Users & Groups in Microsoft Server 2012.
6	Making client or adding computers to domain controller in Microsoft Server 2012
7	Managing Log On & Log In time on client computer for Global users
8	Implementation of Home folder in Microsoft Server 2012.
9	Install and Configure DHCP Server on Microsoft Windows Server 2012.
10	To setup Remote Desktop Services in Microsoft Windows Server 2012.
11	To install and configure Hyper V (Virtualization) on Microsoft Windows 2012 Server.
12	Managing Disks & Disk Storage in Microsoft Sever 2012.

CS/Mn/T/ 300: E-Commerce		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) Mechanism of business transactions through electronic media. ii) Payment transactions in a secured network. iii) Different modes of E-Commerce like Electronic data interchange. iv) Web site establishment, electronic publishing and its importance.		
Course Outcomes (COs) : After completion of the course, students will be able to i) Understand the framework and anatomy of ecommerce applications and analyze ii) ecommerce consumer, organizational applications iii) Infer mercantile process models from both merchant's and consumer's view point iv) Understand the implementation of Electronic Data Interchange (EDI) in day to day life v) Study all the aspects of Intra-Organizational electronic commerce including supply chain management vi) Analyze different consumer, information searching methods and resource discovery and information retrieval techniques.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Electronic Commerce Environment and Opportunities: The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.	10 Hrs.
II	Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash. Internet/Intranet Security Issues and Solutions : The need for Computer Security, Security Strategies, Security Tools, Encryption.	10 Hrs.
III	Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: The Means of Distribution, A model for Message Handling, Email working, Multipurpose Internet Mail Extensions.	10 Hrs.
References: 1. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook. TATA McGraw-Hill Edition. 2. Ravi Kalakotar and Andrew B. Whinston, Frontiers of Electronic Commerce. Pearson Education - 1999. 3 AchuyutS.Godbole and Atul Kahate, Web Technologies TCP/IP to Internet Application Architectures. Tata McGraw-Hill Publishing Company Limited. 4. Schneider, Electronic Commerce, Cengage Publications.		

CS/Mn/T/ 301: Digital Marketing		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) Introduce the fundamental concepts and scope of digital marketing. ii) Familiarize students with various digital marketing channels and online marketing platforms. iii) Develop understanding of social media marketing strategies and online engagement. iv) Provide basic knowledge of digital advertising and online promotion techniques. v) Introduce the concepts and basic techniques of Search Engine Optimization (SEO).		
Course Outcomes (COs) : After completion of the course, students will be able to i) CO1: Explain the basic concepts, scope and importance of digital marketing. ii) CO2: Identify various digital marketing channels and platforms used for business promotion. iii) CO3: Describe the role of social media marketing in customer engagement and brand promotion. iv) CO4: Understand the basic concepts and types of digital advertising. v) CO5: Explain the fundamentals and techniques of Search Engine Optimization (SEO).		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction to Digital Marketing: Meaning and definition of digital marketing, evolution of marketing from traditional to digital, scope and importance of digital marketing, digital marketing environment, digital consumer behaviour, digital marketing channels, traditional marketing vs digital marketing, advantages and limitations of digital marketing.	10 Hrs.
II	Social Media Marketing and Digital Advertising: Introduction to social media marketing, importance of social media in business, types of social media platforms, social media marketing strategies, content creation for social media, organic vs paid marketing, introduction to digital advertising, types of digital advertising – display ads, search ads, video ads and social media ads, targeting methods in digital advertising.	10 Hrs.
III	Search Engine Optimization (SEO) and Search Marketing: Introduction to search engines, working of search engines, concept of Search Engine Optimization (SEO), importance and benefits of SEO, types of SEO – On Page SEO and Off Page SEO, keyword research basics, link building techniques, introduction to Search Engine Marketing (SEM), Pay Per Click (PPC) advertising, overview of SEO tools.	10 Hrs.
References: 1. Digital Marketing – V. Ahuja, Oxford University Press. 2. Digital Marketing – Seema Gupta, McGraw Hill Education. 3. Understanding Digital Marketing – Damian Ryan, Kogan Page. 4. Digital Marketing Strategy – Simon Kingsnorth, Kogan Page.		



B. Sc.

Computer Science (Major)

Semester - VI

CS/DSC/T/350: Python with Data Science		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) To introduce students to Python tools used in Data Science. ii) To understand data handling and analysis using Python libraries. iii) To perform basic data visualization. iv) To apply Python for simple data analysis tasks.		
Course Outcomes (COs) : After completion of the course, students will be able to i) Understand the role of Python in Data Science. ii) Use Python libraries such as NumPy and Pandas for data handling. iii) Perform basic data analysis operations. iv) Visualize data using Python visualization libraries. v) Apply Python techniques for simple data-driven problems.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Functions and Basic Data Structures: Introduction to Functions: Defining and Calling Functions, Function Arguments and Return Values, Introduction to Lists: List Operations and Methods, Introduction to Tuples, Introduction to Dictionaries	10 Hrs.
II	Introduction to Data Science and Python: Introduction to Data Science, Data Science lifecycle, Applications of Data Science, Python for Data Science: Features and advantages, Installing Python and Anaconda, Overview of Jupyter Notebook, Introduction to Python libraries for Data Science.	10 Hrs.
III	Numerical Computing with NumPy: Introduction to NumPy, NumPy arrays and array creation, Array indexing and slicing, Basic operations on arrays, Mathematical and statistical functions, Advantages of NumPy over lists.	10 Hrs.
References: 1. “Machine Learning in Data Science Using Python” -Dr. R. Nageswara Rao, Wiley India-2022. 2. “Python for Data Science”-Dr. Mohd. Abdul Hameed, Wiley India-2021. 3. “Introduction to Data Science: Practical Approach with R and Python” -B. Uma Maheswari, R. Sujatha , Wiley India-2021. 4. “Ultimate Data Science Programming in Python” -Saurabh Chandrakar, BPB Publications-2025. 5. “Python for Data Science” -A. Lakshmi Muddana, Sandhya Vinayakam, Springer-2024.		

CS/DSC/T/ 351: Programing in ASP.NET		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) Understand the .NET Framework and Runtime: ii) Develop a solid foundation in C# language fundamentals iii) Learn and implement various core OOP principles iv) Design and Build Dynamic Web Applications: v) Gain an understanding of ADO.NET and database CRUD operations		
Course Outcomes (COs) : After completion of the course, students will be able to i) Understand the fundamental concepts of the .NET Framework and the C# language fundamentals. ii) Apply object-oriented programming (OOP) principles (classes, inheritance, etc.) in C# applications. iii) Design and develop dynamic web applications using ASP.NET, incorporating standard web server controls and master pages. iv) Connect web applications to databases and perform data manipulation using ADO.NET. v) Debug, test, and deploy ASP.NET applications effectively.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Unit 1: Fundamentals .NET - Web application fundamentals, Client web application vs. server web application, .NET Framework Architecture: Understanding the Common Language Runtime (CLR), Base Class Library (BCL), and how .NET code executes. C# Programming: Data types, variables, operators, control flow statements (loops, conditional), functions, object-oriented programming (OOP) concepts (classes, objects, inheritance etc).	10 Hrs.
II	Unit 2: Core ASP.NET Concepts: Introduction to ASP.NET, Features of ASP.Net, ASP.NET files (.aspx, .aspx.cs) ASP.NET page life cycle, Master Pages & Themes Controls and Events: Web Server Controls: Label, TextBox, Calendar, Dropdown List, Listbox, Checkbox List, RadioButtonList, HyperLink, Table Validation Controls: RequiredFieldValidator, CompareValidator, RangeValidator, RegularExpressionValidator, CustomValidator).	10 Hrs.
III	Unit 3: - SQL Server & Database Connectivity: Database & table creation using SQL Server Management Studio, Introduction to ADO.NET, Connected and Disconnected Architecture, Components of ADO.NET: Connection, Command, DataReader, DataAdapter, DataSet. CRUD operations (Select, Insert, Update, Delete), Display data using DatagridView	10 Hrs.
References: i) ASP.NET The Complete Reference – by Matthew MacDonald, McGraw Hill ii) E. Balagurusamy, Programming in C#, Tata McGraw Hill iii) Shibi Panikkar and Kumar Sanjeev, “C# with .NET Frame Work”, Firewall Media		

CS/DSC/P/ 376: Practical based on CS/DSC/T/350 (Python with Data Science)	
Total Credits : 02	Total Contact Hours : 60 Hrs
Maximum Marks : 50	
List of experiments	
1	Write a Python program to define and call a simple function that prints a welcome message.
2	Write a Python program to create a function that adds two numbers and returns the result.
3	Write a Python program to create a function to calculate the factorial of a number.
4	Write a Python program to demonstrate different types of function arguments (default, positional, keyword).
5	Write a Python program to create a list of numbers and perform basic list operations (append, insert, remove).
6	Write a Python program to find the largest and smallest elements in a list.
7	Write a Python program to count the number of occurrences of an element in a list.
8	Write a Python program to sort a list in ascending and descending order.
9	Write a Python program to demonstrate list slicing operations.
10	Write a Python program to create and access elements of a tuple.
11	Write a Python program to convert a list into a tuple and display the elements.
12	Write a Python program to create a dictionary containing student details (name, roll number, marks) and display them.
13	Write a Python program to add, update, and delete elements in a dictionary.
14	Install Anaconda and run basic Python commands using Jupyter Notebook.
15	Create a Jupyter Notebook and demonstrate Markdown cells and code cells.
16	Import commonly used Python libraries for Data Science such as NumPy and Pandas.
17	Write a Python program to create NumPy arrays using different methods.
18	Write a Python program to perform indexing and slicing operations on NumPy arrays.
19	Write a Python program to perform basic arithmetic operations on NumPy arrays.

Practical based on CS/ DSC/T/(B): Programing in ASP.NET Total Credits : 02 Maximum Marks : 50 Total Contact Hours : 60 Hrs	
List of experiments	
1.	Basic "Hello World" application in ASP.NET
2.	Create an application using controls to accept height and breadth of a triangle and display the area of triangle.
3.	Create an application to input age of the candidate and display eligible for voting or not, on button click.
4.	Create an application to input line character, length and display the line with given character and length. For ex. a line of '#' with length 40 character
5.	Create a web form using TextBox, Button, and Label controls to capture employee information and display output on button click.
6.	Build student survey form to accept information like name, class, hobbies, sports interests, city, state, country etc and display output on button click.
7.	Create an application for students test information like seat no, exam session, marks perform required input validation.
8.	Create an application to display calendar and show user selected date
9.	Create a consistent look and feel across multiple pages of your college website using Master Pages.
10.	Create an application to demonstrate the class and object.
11.	Build an demo application for establishing connection to SQL database and table
12.	Build application to input student survey information and store it in the related SQL table.
13.	Build application to accept student of grocery item, search the record in related SQL table and display the student details.
14.	Build application to input student id and delete the record from the related SQL table.
15.	Create an application to provide list of classes and display records of all students with matching classes from underlying table using DataGridView.

CS/DSC/T/ 352: Vedic Mathematics		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) To enhance calculation speed and mental ability by providing alternative methods to perform arithmetic operations quickly. ii) To emphasize the development of problem-solving skills by introducing various strategies iii) To foster a deep understanding of numbers and their properties. To introduce ethical principles in computing and software development .		
Course Outcomes (COs) : i) These techniques involve breaking down complex calculations into simpler steps ii) Vedic mathematics exercises are designed to enhance memory power and concentration by engaging students in mental calculations and visualization techniques. iii) Develop and maintain problem-solving skills		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction and History of Vedic Mathematics, Sutras of Vedic Mathematics Addition & Subtraction: Addition from left to right, Addition of list of numbers- Shudh method, Subtraction- Base method	10 Hrs.
II	Multiplication with the series of 9s, Multiplication of a number by same number of 9s Multiplication of a number by greater number of 9s, Multiplication of a number by lesser number of 9s Multiplication by 11, Multiplication by 111, 2-digit multiplication, 3-digit multiplication	10 Hrs.
III	Division: Division by 9 , Divisibility Test of numbers by 11 Squaring numbers ending in 5, Squaring decimals and fractions	10 Hrs.
References: 1. Learn Vedic speed mathematics by Chaitanya Patil 2. Vedic Mathematics for all ages by Vandana Singhal 3. Vedic Mathematics made easy by Dhaval Bhatia 4. The essentials of Vedic Mathematics by Rajesh Thakur 5. Vedic Mathematics New Horizons by Dr. S.K. Kapoor 6. Vedic Mathematics for students by Manu Tripathi		

CS/DSE/T/350: ML Basics		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) Introduce the fundamental concepts and terminology of Machine Learning. ii) Explain different learning paradigms and basic ML workflow. iii) Familiarize students with common machine learning algorithms. iv) Develop understanding of model evaluation and performance measures. v) Create awareness about real-world applications and ethical issues in ML.		
Course Outcomes (COs) : After completion of the course, students will be able to i) CO1: Explain the basic concepts and scope of Machine Learning. ii) CO2: Distinguish between supervised, unsupervised and reinforcement learning. iii) CO3: Describe commonly used machine learning algorithms. iv) CO4: Apply basic concepts of model training, testing and evaluation. v) CO5: Identify applications and ethical challenges of Machine Learning.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction to Machine Learning: Definition of Machine Learning, Relationship between Artificial Intelligence, Machine Learning and Data Science, Evolution and need of Machine Learning Types of learning: Supervised learning, Unsupervised learning, Reinforcement learning, Typical Machine Learning workflow, Applications of Machine Learning, Advantages and limitations of ML.	10 Hrs.
II	Data and Pre-processing: Types of data used in Machine Learning, Data collection and data representation, Data cleaning and handling missing values, Feature selection and feature extraction (concepts), Data normalization and scaling, Training data and test data, Supervised Learning Algorithms: Concept of classification and regression, Linear regression, Logistic regression, k-Nearest Neighbour (k-NN).	10 Hrs.
III	Unsupervised Learning and Model Evaluation: Clustering concepts, k-means clustering, Hierarchical clustering (overview), Dimensionality reduction (basic idea), Model evaluation techniques, Confusion matrix, Accuracy, precision, recall and F1-score, Cross-validation (concept), Machine learning applications in healthcare, finance and education, Ethical issues in Machine Learning.	10 Hrs.
References: 1. “Machine Learning Using Python”, Manaranjan Pradhan, & etc., Wiley India, 2019.. 2. “Machine Learning”, Saikat Dutt, Subramanian Chandramouli, Pearson India, 2020. 3. “Practical Machine Learning with Python”, A. T. V. Kiran, BPB Publications, 2019. 4. “Machine Learning and Data Science”, Deepak Garg, Cengage India, 2021. 5. “Machine Learning Using R and Python”, Manaranjan Pradhan, Wiley India, 2020.		

CS/DSE/T/351: Word-Press		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course: i) Introduce students to the fundamental concepts of Word-Press. ii) Enable students to develop personal and commercial Blogs.		
Course Outcomes (COs) : After completion of the course, students will be able to i) Understand Word-Press Basics. ii) Writing and managing personal and commercial blogs. iii) Hosting a blog on wordpress.org. iv) Publish a private or public blog.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction to WordPress: Benefits of WordPress, popular blogging tool, WordPress's capabilities, WordPress Platform, Versions of WordPress, self hosting, types of blogs, Archiving publishing history, Interacting with readers through comments, Feeding your readers, Tracking back.	10 Hrs.
II	WordPress as a Content Management System: Difference between a website and a blog, Business of Blogging, Creating a WordPress Account, WordPress menus, dashboard and its modules, important option setting of blog.	10 Hrs.
III	Writing and managing a blog: Inserting media files, Refining post options, Publishing post, Creating filling post categories and subcategories, Creating and Categorizing Blogroll, Managing and Inviting Users, Managing and Inviting Users, Setting Up Your Front Page, Publishing a Public or Private Blog.	10 Hrs.
References: 1. "WordPress for Dummies a Wiley brand" - Lisa Sabin-Wilson , John Wiley & Sons, Inc. 2. " Mastering WordPress- Advanced Development Techniques" – Mrs. Ruchi Mishra, O'Reilly Media 3. "Ultimate WordPress Handbook: An Essential Guide to Designing Stunning WordPress Websites, Driving Traffic, and Boosting Revenue (English Edition)" - by Tricia Elizabeth Ulberg (Author), Daniel Bisett 4. "WordPress in easy steps"- by Darryl Bartlett		

CS/DSE/T/376: Practical based on CS/DSE/T/350 (ML Basics)	
Total Credits : 02 Total Contact Hours : 60 Hrs	
Maximum Marks : 50	
List of experiments	
1	Write a Python program to demonstrate the basic Machine Learning workflow (data loading, training, testing).
2	Compare Artificial Intelligence, Machine Learning, and Data Science with suitable real-life examples.
3	Identify different types of Machine Learning (Supervised, Unsupervised, Reinforcement) using examples.
4	Write a Python program to handle missing values in a dataset (mean/median/mode imputation).
5	Perform data normalization and standardization on a given dataset.
6	Load a dataset and split it into training and testing sets .
7	Demonstrate feature selection using simple statistical methods.
8	Perform basic data visualization for understanding dataset features.
9	Implement Linear Regression using a simple dataset and display predicted values.
10	Implement Logistic Regression for binary classification.
11	Implement k-Nearest Neighbour (k-NN) algorithm for classification.
12	Compare classification and regression with suitable examples.
13	Implement k-means clustering on a dataset and visualize clusters.
14	Perform basic dimensionality reduction (e.g., using PCA concept demonstration).
15	Evaluate a classification model using confusion matrix, accuracy, precision, recall, and F1-score .

CS/DSE/P/377: Practical based on CS/DSE/T/351 (WordPress)	
Total Credits :02	Total Contact Hours: 60Hrs
Maximum Marks : 50	
List of experiments	
1	Installation and configuration of a local server environment (XAMPP/WAMP) to host WordPress. Downloading WordPress core files,
2	Creating a MySQL database, Database creation and core file setup for a "Self-Hosted" site.
3	Identifying the current WordPress version and performing a manual update of core files. and understanding the "Automatic Update" system.
4	Configuring "Discussion" settings to enable/disable comments and managing the comment moderation queue.
5	Setting up "Feed" settings for XML/RSS feeds for external readers and demonstrating how Trackbacks / Pingbacks work between two blog posts..
6	Add post on WordPress and demonstrating inter-blog communication by linking two local posts.
7	Study of WordPress Dashboard modules and customizing the Screen Options. Personalizing the "At a Glance" and "Quick Draft" modules in the admin area.
8	Configuring WordPress to act as a static "Business Website" versus a "Dynamic Blog" via the Reading settings.
9	Changing a site from a "Latest Posts" homepage to a "Static Front Page."
10	Setting up Site Title, Tagline, and SEO-friendly Permalink structures (Post name vs. Numeric). Designing primary, secondary, and footer navigation menus.
11	Configuring Site Identity (Title, Tagline, and Site Icon/Favicon).
12.	Enabling/disabling dashboard modules using the "Screen Options" tab.
13.	Writing a blog post and using the "Add Media" tool to insert images, galleries, and audio/video files, embedding external YouTube videos.
14.	Creating a hierarchy of Categories and Subcategories and assigning multiple tags to a post.
15.	Creating and categorizing a "Blogroll" (Links) to external resources and displaying them using widgets.
16.	Inviting new users Creating users and assigning different roles different capabilities (Administrator, Editor, Author, Contributor, Subscriber).
17.	Publishing "Password Protected" and "Private" posts for restricted viewing.

CS/Mn/T/ 350: Ethics and Cyber Law		
Total Credits : 02		Total Contact Hours : 30 Hrs.
Maximum Marks : 50		
Learning Objectives of the Course:		
i) To introduce ethical principles in computing and software development . ii) To provide knowledge of cyber laws, digital security, and legal compliance in IT systems.		
Course Outcomes (COs) :		
After completion of the course, students will be able to i) Understand professional and ethical responsibilities in software and IT industries. ii) Identify and analyze cyber crimes and security threats . iii) Apply provisions of cyber law in system design and data handling . iv) Ensure legal and ethical compliance in computing practices.		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Ethics in Computing: Definition and importance of ethics, Computer ethics, Professional ethics in software engineering, Codes of conduct (ACM/IEEE), Ethical issues in IT systems, Data privacy and protection, PAPA Framework (Privacy, Accuracy, Property, Accessibility). Ethical Issues in Emerging Technologies: AI ethics, Data bias, Surveillance, Social media responsibility, Ethical hacking vs malicious hacking. Introduction to Cyber Law: Cyberspace, Need for cyber laws, Global and Indian perspectives on cyber law.	10 Hrs.
II	Cyber Crimes and Security Threats: Types of cyber crimes—hacking, phishing, malware attacks, ransomware, identity theft, denial-of-service attacks, cyber stalking, cyber terrorism. Network and Data Security Basics: Encryption, authentication, digital certificates, basic cyber security practices for developers.	10 Hrs.
III	Intellectual Property Rights (IPR) in Software: Copyright, patents, trademarks, open-source licensing, software piracy, plagiarism detection Privacy and Data Protection: Data protection laws, user data handling, GDPR basics (conceptual), privacy policies in applications. Ethics in Software Development Lifecycle: Secure coding practices, responsible data usage, ethical testing, user consent, accessibility in design.	10 Hrs.
References:		
1. Cyber Law & Cyber Crimes” – Vivek Sood 2. “Information Technology Law and Practice” – Vakul Sharma 3. “Cyber Ethics: Morality and Law in Cyberspace” – Richard Spinello 4. “Computer Ethics” – Deborah G. Johnson		

CS/Mn/T/ 351: Social Media Marketing Total Credits : 02 Total Contact Hours : 30 Hrs. Maximum Marks : 50		
Learning Objectives of the Course: i) Introduce students to the concepts of Social Media Marketing. ii) Enable students to be equipped to enhance brand awareness and customer engagement through innovative and ethical marketing practices.		
Course Outcomes (COs): After completion of the course, students will be able to i) Interpret the significance of digital marketing in the context of traditional marketing practices. ii) Illustrate the various types of digital marketing channels and their respective advantages and disadvantages. iii) Paraphrase the role of search engine optimization (SEO) in improving website visibility and ranking on search engine results pages. iv) Construct a comprehensive social media marketing strategy		
Module No.	Topics / Actual Contents of the Syllabus	Contact Hours
I	Introduction: What is Marketing? What is digital marketing? Advantages and Disadvantages of Digital Marketing, Difference between traditional marketing and digital marketing, What Is Social Media Marketing?, Big Brands and Social Media, Small Business and Social Media, Pay-Per-Click Marketing (PPC), Influencer Marketing, SEO,	10 Hrs.
II	WordPress as a Content Management System: Difference between a website and a blog, Business of Blogging, Creating a WordPress Account, WordPress menus, dashboard and its modules, important option setting of blog.	10 Hrs.
III	Writing and managing a blog: Inserting media files, Refining post options, Publishing post, Creating filling post categories and subcategories, Creating and Categorizing Blogroll, Managing and Inviting Users, Managing and Inviting Users, Setting Up Your Front Page, Publishing a Public or Private Blog.	10 Hrs.
References: 1. "WordPress for Dummies a Wiley brand" - Lisa Sabin-Wilson , John Wiley & Sons, Inc. 2. " Mastering WordPress- Advanced Development Techniques" – Mrs. Ruchi Mishra, O'Reilly Media 3. "Ultimate WordPress Handbook: An Essential Guide to Designing Stunning WordPress Websites, Driving Traffic, and Boosting Revenue (English Edition)" - by Tricia Elizabeth Ulberg (Author), Daniel Bisett 4. "WordPress in easy steps"- by Darryl Bartlett		